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A CONSTRUCTIVE POLICY FOR PUBLIC SERVICE CORPORATIONS

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I am glad to have this opportunity to call your attention to the significant trend of public service activities as it appears to some of us who are engaged in the management of public utilities.

The constructive policy which I will outline is predicated upon the existence of *governmental regulation*. This premise must be accepted with that enthusiasm which springs from a genuine conviction that the principle of regulation is not only inherently sound but that results secured have demonstrated its practicability. Its aim, therefore, must be to meet the fundamental obligations imposed by all regulation, namely: the attainment of maximum operating efficiency and the division of the resulting benefits with the public in accordance with a prescribed plan.

Legislative enactments of many states have provided for this by requiring that charges shall be based upon actual cost plus a reasonable margin of profit. Consequently, we have entered upon a new era which has removed the utilities from the zone of private enterprise governed by competition to that of public business subject to regulation and involving the right of the public to an intimate knowledge of every detail of the corporations' activities.

As a matter of fact, there is little opposition to the principle of regulation; it is the actual results of legislative enactments and commission activities that most frequently occasion dissatisfaction and open protest. Many laws governing public service commissions are faulty and illogical; many commissioners lack the proper qualifications; many decisions have been but illogical compromises. Therefore, the public service corporations quite naturally have felt that their most vital interests were jeopardized. However, the soundness of the principle of regulation must not be questioned on account of the existence of faults in its application, although, of course, we will lose the benefits which it should afford if a constructive policy is not established which will eliminate these serious defects.

While there has been a tendency to look to the public for a remedy, through the correction of faulty laws, and to the commissioners, through a modification of their points of view, *we believe that the responsibility rests squarely upon the corporations themselves. They alone can furnish those facts and statistics without which all argument is futile.*

Such vexing problems as arise in connection with regulation and competition; municipally versus privately operated utilities; what constitutes equitable rates and standards of service, etc., must ultimately be removed from the field of individual opinion and debate to that in which scientific analysis and economic laws will govern. Therefore, the policy which I will outline is not concerned in the first instance with the problems themselves but rather with the establishment of those fundamental conditions which in time should create unanimity of opinion as to the proper procedure.

Fortunately, much of the admirable work which has already been done, particularly in connection with the design and utilization of equipment, exemplifies the effectiveness of certain principles upon which this constructive policy must be predicated. It is with these principles, therefore, that we are concerned primarily. We know of no better illustration of their application than the splendid economies which have been effected in the generation of electric current. The development of the modern steam turbine and electric generator has resulted primarily from a most exhaustive and painstaking study and scientific analysis of all of the technical factors involved. The mechanical, electrical and thermo-dynamic problems have received the concentrated attention of hundreds of our most competent engineers, all striving to gain greater efficiency through a more perfect embodiment of fundamental laws in the machinery of their design. Of course, if the collective data of the past had not been carefully classified and recorded and basic laws derived therefrom, there would have been no definite point of departure for still greater refinement in theory and more perfect embodiment of these laws in practice. In that event the step from the reciprocating engine to the steam turbine would still remain to be taken.

What principle, then, has all this collective work fulfilled? Briefly stated, it is the principle of scientific analysis and deduction. The ruling motive has been, on the one hand, to interpret precisely the basic scientific laws involved and, on the other, the embodiment

in the needed equipment or apparatus of features which lend themselves to the most perfect functioning of these laws to the ends desired. It must be clear that every subsequent material benefit will result only through the acquisition of more precise and voluminous data, the discovery of new laws or the refinement of existing ones, or the more complete embodiment of these laws in the facilities produced. There is no room for mere opinion with regard to these matters.

Today no layman would presume to dispute the basic principles which have governed in the design of modern power plant equipment; and yet, well within the life-time of many of our foremost engineers, the technical questions to which we refer were not only settled empirically, but were often considered to be suitable subjects for individual opinion and debate.

However, the installation of efficient equipment does not insure the economical and continuous generation of electric current. Passing from the field of the technical engineer to that of the engineer-manager, we find that his contributions are only second in importance to those of the designer. These men must harvest the full benefits of which the modern steam power plant is capable. Upon first thought this may appear to be a relatively simple matter and, in fact, it was so considered in the earlier days of public service operation. Now, however, power plant employees are selected with painstaking care, every factor bearing upon their mental and physical fitness for the task being taken into consideration. Nor does the work stop when the selection has been made. The men are constantly trained in the use of the equipment, often with as much care as is expended in the training of athletes, and their retention depends entirely upon their ability to develop progressively under such a régime. Here, then, we find the principle relating to the scientific selection and progressive development of employees, a principle which has been recognized and conscientiously fulfilled for many years in certain departments of public service work.

The next step fulfills the third principle, which imposes the duty of providing ways and means of bringing together the trained power plant employees and the methods embodying the scientific laws in accordance with which the plant must be operated. This has required, among other things, the preparation of complete instructions to serve in all contingencies as a guide to the employees. In certain

plants additional compensation is paid in the form of higher wages or a bonus when the men, through the complete exercise of their skill and dexterity, fulfill the conditions as laid down.

Maximum power plant efficiency, however, is not assured through superlative service upon the part of the power plant operatives alone. Many conditions must be taken into account which originate outside the station, in connection possibly with a vast network of transmission lines, sub-stations, distribution systems and the individual installations of customers. This brings us to the fourth, last and most important principle which has contributed to the splendid efficiency attained in connection with the generation and distribution of electric current. It dictates that the burden of power plant operation rests, in the final analysis, upon the management not upon the power plant employees. We find the management taking the initiative with regard to the continuous despatching of load, issuing instructions relative to the harmonious and efficient operation of various power plants in combination and giving directions during times of stress and breakdown.

The direct results which have followed the conscientious application of the four principles in question have been:

First—Operating costs (excluding interest and depreciation) of many of our large stations have been brought down to five mills or less per kilowatt hour, depending upon local conditions, cost of fuel, etc.

Second—A degree of continuity of service has been attained in connection with properties serving large geographical territories which no one would have cared to predict a few years ago.

Third—The subject of power generation and distribution has been taken bodily out of the field of individual opinion and debate, as it is now recognized as being governed by well defined laws concerning which the expert alone has a right to an opinion.

It is not only in the field of power plant operation that these principles have been applied with the utmost success. One large public service corporation in the Northwest has already accomplished such notable economies in the cost of constructing transmission lines that they would be doubted were not records available which afford irrefutable proof. All conditions were subjected to painstaking scientific analysis; the workmen were selected with regard to their fitness for the task; definite instructions were drawn up as a basis for their activities; bonuses were paid when definite tasks were

fulfilled, and entire responsibility for the work in its most minute details was assumed by the management. Other illustrations could be cited readily but the foregoing examples will serve our present purpose.

The new policy to which we refer obligates public service corporations to apply these principles to every conceivable branch of internal activity. Maximum efficiency and economy are bound to accrue through the application of these principles to: major construction work, such as new extensions; routine construction work, such as connecting customers; maintenance work in all of its various ramifications; all operating functions, such as power generation, systematic patrol of transmission and distribution lines, periodical inspection and testing of all equipment; and all general business and administrative functions arising in this connection.

While the actual methods of applying such principles to these functions are in a sense secondary in importance, nevertheless they must provide:

For the absolute control of materials and labor through proper store-keeping and time-keeping systems;

The adoption of a comprehensive classification of income and expense;

A planning department through which all activities are directed; and

A cost-keeping system whereby a minute analysis will automatically and continuously check up the results of actual operation and afford a basis for further refinements.

As already stated, however, our policy not only makes high internal efficiency imperative but it also requires that convincing proofs of such results should be available to the public service commissions. It must be apparent that when these principles have been applied to every internal activity there should be no difficulty in fulfilling this requirement. Public service commissions will be in a particularly fortunate position in this regard as the accumulation of fundamental records or statistics relating to the operation of many corporations will form a sound basis for the establishment of standards which must command respect.

Now let us consider these well tried principles in connection with the equally important factors arising through our new obligations to the public resulting from governmental regulation. We have dealt with the *generation* of electric current; let us now consider the

sale of current, confining ourselves to light and power properties for the purpose of illustration.

Before the advent of regulation, competition influenced rates to such an extent that in many cases they did not represent actual cost plus what might be considered to be a reasonable profit. It must not be inferred from this that such rates were necessarily too high; in fact, rates were frequently forced down to a losing basis with the consequent disastrous effects. The establishment of regulation in many states is so recent that the corporations have not yet been able to adopt new rate schedules based on costs. Of course, there has always been an effort made to do this in so far as competitive conditions would permit, with the idea that reasonable rates would stimulate the use of electric current. Recognizing that the cost of service does not increase in direct proportion to the amount of current consumed, public service managers attempted to meet these conditions through the adoption of a sliding scale providing for a reduction in rate as the consumption increases. Rates of this kind, however, while pointing in the right direction, only approximate an equitable charge under the new order of things. They were not based upon a definite knowledge of the characteristics of operating costs which can be revealed only by an exhaustive analysis of daily and monthly records.

Rapid strides have been made recently toward the solution of this pressing need, particularly in those states where regulation has been established for some time. The work of the Wisconsin commission has been notable in this regard; Mr. Erickson's contributions especially having paved the way for a system of rate making that promises to meet almost every requirement. Such work is very significant in the present connection for it exemplifies admirably the convincing and satisfactory character of results which accrue when the foregoing principles are applied to those *external* relations, around which so much controversy now centers. In this connection a thorough and exhaustive knowledge of costs and operating conditions is imperative. However, the acquisition of suitable and adequate cost records and a knowledge of their inter-relations and individual characteristics for a given property is an enormous task, frequently necessitating the introduction of entirely new managerial methods. Nevertheless, the benefits secured justify in many ways the time and money expended. In so far as rates for service are concerned, such work shows:

That a considerable part of operating cost or expenses *remains stationary* for long periods, even though the use of current increases at a rapid rate;

That another part increases when more customers are added to the system but is also independent of current consumption;

That it is only the remaining charges that accumulate in *direct proportion to the actual kilowatt hours sold*;

That taxes, interest and depreciation increase in proportion to the value of the property needed to serve the customers in question. Therefore, it is quite possible that any class of customers may increase their current consumption two or three fold and yet their just proportion of these charges would remain stationary.

I have referred but to the broad and universal characteristics of operating expenses incurred by light and power properties. If we bear in mind that many such companies serve a number of communities and that each community may readily comprise ten or more classes of customers and that the inter-relations of costs, instead of being characterized by the simplicity of our illustration, are complex to a degree; then the task which is imposed by the establishment of equitable rates will be more fully appreciated. Therefore, we should not be surprised when we find that individual opinion and debate merely lead to a greater diversity of opinion and more heated controversy.

Is it not apparent that rates arrived at in the way suggested will be satisfactory to everyone concerned? Let me show you the fallacy of the straight kilowatt hour rate when subjected to this kind of analysis. Such a charge provides an equitable return only in the case of one specific rate of consumption. If the consumption is greater, the charge is too high; if less, the charge is too low. This results directly from the fact that in all cases a part of the bill rendered for service should be treated as a fixed amount to cover expenses which do not increase with a considerable increase in the use of current. This is particularly true in the case of residential customers. If, for example, \$1.20 per month proved to be a proper price to charge for the use of 10 kilowatt hours, then the equivalent straight rate would be 12 cents per kilowatt hour. However, an analysis of the expenses incurred in this case might show that 90 cents of this amount represents the return which should be secured in connection with stationary costs (such as bookkeeping, reading meters, rendering bills, fixed charges on certain equipment, etc.). With this fact before us, a fixed charge of 90 cents and a kilowatt hour

charge of 3 cents, yielding the same total of \$1.20, would appear to be equitable. Such a rate, however, would permit this customer to triple his consumption without increasing the stationary expenses, with the result that his bill would be but \$1.80 instead of the \$3.60 which would result from the 12-cent rate. In practice the straight kilowatt hour charge, particularly when applied to residential customers, has been made high enough to assure a satisfactory return, even when the use of current is restricted to the minimum amount consistent with the daily needs of the average customer. It follows, therefore, that the customer whose consumption exceeds this minimum pays more than his share of the stationary expenses. The inevitable result of this is that a majority of customers cannot afford to use current for many of the purposes to which it is now adapted and the corporations lose the many benefits which should follow an increased use.

Summing up, then, the benefits which we should confidently anticipate as a result of this method of rate setting, we have the following:

First—Such rates will just yield a return equal to the cost and fixed charges incurred plus a fair margin of profit; consequently, total gross income will be equitably apportioned among the respective classes of customers.

Second—Customers will secure the maximum benefits which should result from time to time from the introduction of more modern equipment and more efficient managerial methods.

Third—Public service corporations and their customers will mutually profit through the increased sale of current which is certain to follow; for greater output means lower unit costs.

Fourth—The clarification of the rate question will assist materially in the solution of many other trying issues. For example, the large economies in the cost of power effected through serving a wide territory from one central station will be appreciated by everyone and such procedure endorsed when the resulting advantage is fully reflected in the rates.

Fifth—The subject of rates will eventually pass from the jurisdiction of individual opinion and debate to that of unvarying scientific laws.

Commissioners are confronted by many other important questions which can be properly settled only by the application of the same principles. Most of the laws which they administer give sweeping powers as a means towards thorough regulation. Many of the people who are not familiar with the intricacies of public service business have inferred that within a relatively short time

the respective commissions would have the various utilities in their jurisdictions under adequate control. Where the monopolistic principle has been incorporated in the law, the public at large has expected that actual results would, in a short time, convince even the layman of the wisdom of having accorded such sweeping rights. On this account many commissions have had to face open criticism or an undercurrent of disapproval for, in but few instances, have the results of their activities been reassuring in this broad and immediate sense. It must be apparent that the commissioners have not been responsible for this condition. It has arisen primarily through the inability of the corporations to produce adequate and reliable records, which must be available before existing laws can be enforced equitably.

I hope that the foregoing illustrations and comments, notwithstanding their inadequacy, will win your support for the constructive policy for public service corporations, the elements of which are summed up as follows:

This policy is predicated upon the following premises:

1. The recognition of governmental regulation as a necessary condition to the maintenance of satisfactory relations between the public service corporations and the public.

2. The acceptance by the public service corporations of the responsibility for the necessary constructive policy.

The elements of the policy are:

First—Public service corporations shall enlighten the commissions concerning every conceivable phase of their activities.

Second—Actual results of operation must be depended upon as the only true basis upon which the many questions at issue can be properly solved.

Third—The corporations must be allowed to participate with the public in the economies for which they are directly responsible, thus affording the necessary incentive for continually increasing efficiency and for more effective coöperation between the utilities and the public.

Fourth—Every conceivable activity relating to public service work shall be handled in accordance with the dictates of the following principles:

The first of these principles relates to the acquisition, tabulation and classification of all existing knowledge pertaining to every phase of the business and the perpetuation of such records.

The second principle relates to the scientific selection and careful training in standard methods of all of the employees engaged upon the property and to their progressive development.

The third principle relates to the necessity of bringing together by suitable means the results of the scientific analysis of existing data and the properly selected and trained operatives.

The fourth principle, and in a sense the most important, relates to a new conception of the division of work between the so-called management or administrative force and the operatives or workmen. It requires that the burden of management, not in the accepted sense, but with regard to the smallest details, shall fall upon the managers; those who are alone in a position to assume this responsibility intelligently.

Is it not clear that this is the type of management that must form the basis of any truly constructive policy? Unfortunately, these principles have been applied to but few public service activities. However, if the accuracy of our predictions is doubted, we have only to turn to the industrial world, where the basic soundness of these principles and the resulting methods has been demonstrated beyond possibility of contradiction; for these are the principles which Fred W. Taylor advocated many years ago and upon which all of his now classic work in the field of management has been founded.

While we public service managers have in the past unconsciously fulfilled these principles in isolated cases and without realization of their fundamental character or universality of application, Mr. Taylor has founded upon them a new philosophy of management which has already wrought revolutionary changes in entire groups of industrial activity.

Internal efficiency has been enormously increased but possibly the solution of the labor problem in plants operating under scientific management is Mr. Taylor's greatest contribution. In the public service field, scientific management will bring about equally high internal efficiency and, further, through its extension to all external relations with the public and commissions, it will prove to be the most potent single instrumentality in accomplishing those results which are the primary purpose of every regulative enactment.

Please do not leave this subject with the impression that the constructive policy which we offer could have been or can now be put into effect by the mere issuing of orders. We must recognize existing conditions, together with the great divergence of sincerely held opinions, as a part and parcel of the material with which a truly constructive program must deal. Such a program, if sound, will compel the ultimate acceptance of that which is right and the abandonment of that which is faulty. While this process will, of

necessity, be slow and while many of us believe that we can see short cuts to a prompt and equitable solution of the entire subject, nevertheless, in the long run it will prove to be the only route that is marked by permanent success.

The new era will come through a gradual evolution, building upon and encompassing the heritage which has resulted from one of the most notable developments during recent years. Further, the work will never be finished so long as the sciences involved and the art of management continue to progress.